

North of the Delta
Offstream Storage Investigation

Progress Report

Appendix J: Recreation Requirements and Opportunities: Sites Reservoir Alternative

April 2000

Integrated
Storage
Investigations

CALFED
BAY-DELTA
PROGRAM

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Introduction

In late 1997, DWR began a two-year reconnaissance level study of North of the Delta Offstream Storage under Proposition 204-the Safe, Clean, Reliable Water Supply Act approved by voters in 1996. In early 1999, CALFED consolidated all storage investigations under a comprehensive program called Integrated Storage Investigations. The North of the Delta Offstream Storage Investigation was incorporated into one of seven ISI program elements.

The North of the Delta Offstream Storage Investigation continues engineering, economic, and environmental impact analyses to determine the feasibility of four north of the Delta storage projects. The four potential alternatives are Sites Reservoir, Colusa Project, Thomes-Newville Project, and Red Bank Project. Phase I, currently underway, includes preliminary field surveys of environmental resources and extensive field surveys of cultural resources, geological, seismic and foundation studies, and engineering feasibility evaluation. Phase II will start when CALFED's Record of Decision for the Programmatic EIR/EIS is completed and if north of Delta offstream storage is consistent with CALFED's preferred program alternative. Phase II will include preparation of project-specific environmental documentation, final project feasibility reports, and the acquisition of permits necessary to construct the project identified as most feasible.

Recreation is one valuable benefit provided by public and private water supply projects. While the ultimate responsibility for planning and development of recreation facilities is normally borne by the agency leading reservoir development, and this program is still in a stage where the merits of alternatives are being reviewed and evaluated, it is wise to begin scrutiny of opportunities and issues earlier in the process. This helps ensure that benefits are maximized and the many facets of planning are coordinated.

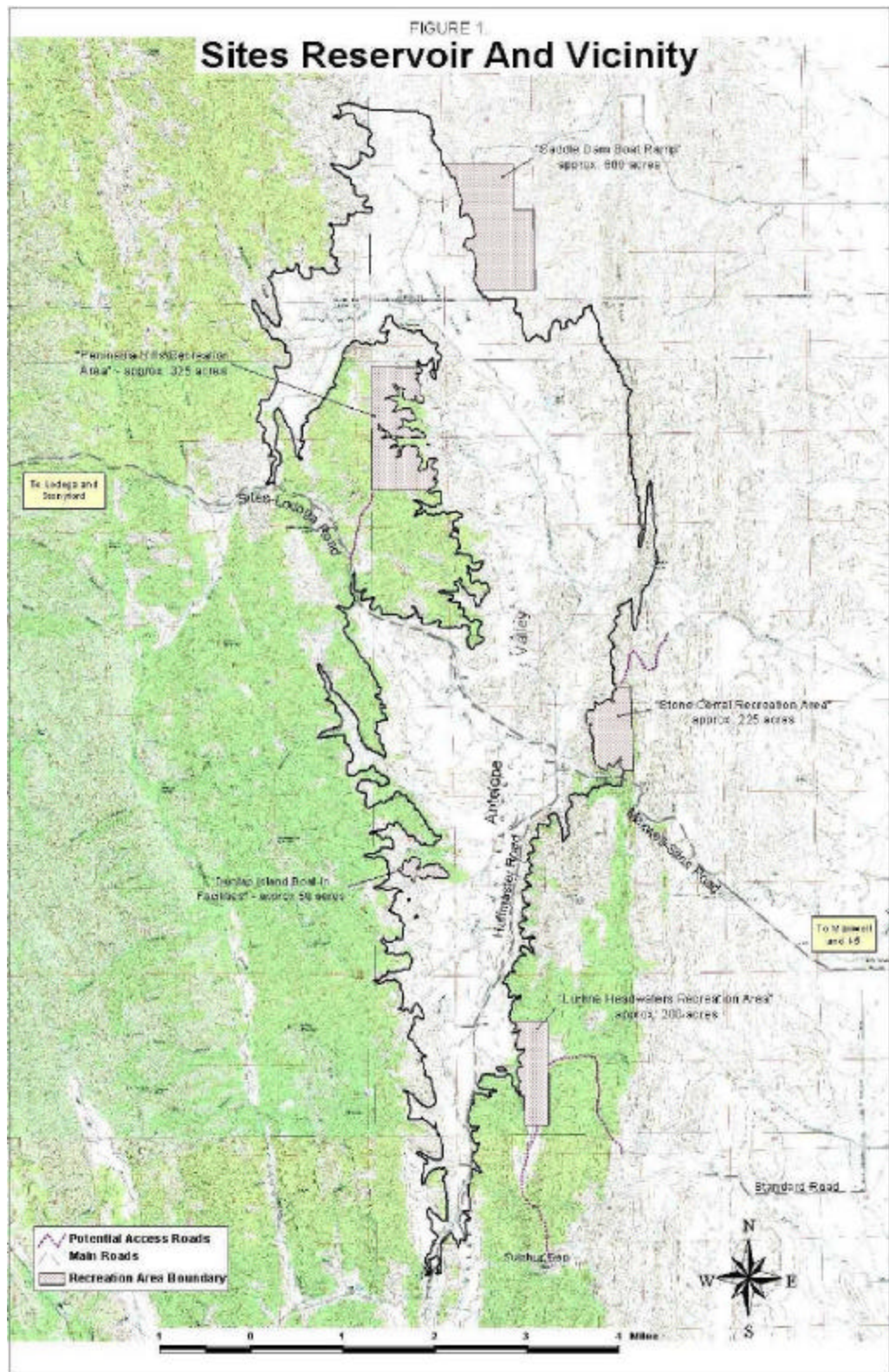
This report is the first in a series, intended to describe the potential of North of the Delta offstream storage alternatives to provide recreation opportunities and benefits. Herein are reported the results of a 1999 reconnaissance investigation of recreation opportunities for the Sites Reservoir alternative. The results of a 2000 investigation into the recreation potential of the Thomes-Newville Reservoir alternative will be prepared during summer of 2000 under a separate cover. Investigation, evaluation, and reports of the recreation potential of other alternatives may be prepared thereafter, if warranted.

Since recreation opportunities are often created by water facility development, and because recreation use provides economic benefits which may contribute to overall project feasibility, this report was prepared to supplement the various engineering and environmental studies of the Offstream Storage Program. It provides planners with the information necessary to efficiently consider recreation benefits if other engineering, environmental, and land acquisition activities proceed.

This report identifies the recreation potential, and discusses the feasibility of recreational facility development, at the proposed Sites Reservoir. The reservoir would be located in Antelope Valley (Colusa County) about 7 miles west of the town of Maxwell, in the eastern foothills of the Coast Range and, as currently conceived, would impound

about 1.8 million acre-feet when full to elevation 520 feet. Two major dams and several saddle dams would inundate Antelope Valley (Figure 1). Evaluation of recreation potential of alternative Offstream Storage reservoirs will be prepared at a later date; Sites Reservoir was selected as the first subject of study because of a general lack of previous study of recreation potential at the 1.8 maf formulation.

This report includes a review of relevant past recreation planning documents, an inventory of similar reservoir-based recreation facilities and use in the region, a general assessment of the need for recreational facilities, descriptions of areas potentially suitable for recreation development, identification of potential access to these areas, hypothetical layouts of potentially suitable facilities, mileage range maps intended for later calculation of potential recreation demands and economic benefits, a list of data needs for future feasibility-level recreation planning, and photographs.



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Summary

Shoreline areas at the proposed Sites Reservoir would present a relatively limited number of opportunities for the establishment of recreation facilities. Steep topography and the potentially large fluctuations in water surface elevation indicated in some current operation scenarios combine to make many areas unsuitable, including most identified in a 1965 report on this subject. However, after thorough map review and field visits to all "shoreline" locations, we identified four shore-based areas with excellent potential for development of traditional recreation facilities. A fifth area would offer boat-in access and is suitable for primitive facilities. Total shoreline lands necessary for development of all suitable areas would total about 1,350 acres. Additional land or easements may be required for construction of access roads to these areas.

This report also includes an inventory of existing recreation facilities at four local reservoirs: Black Butte, Stony Gorge, East Park, and Indian Valley. All of these regional recreation opportunities are much smaller than Sites Reservoir, and most facilities developed there are relatively primitive. Sites Reservoir would be large, suggesting that demand for recreation at Sites may be relatively high. Additional study, including a recreation use survey at an existing reservoir, is required to reasonably estimate potential demand for facilities and use at Sites. However, a reservoir this size could reasonably be expected to support several hundred thousand recreation-days of use per year.

Obligations and responsibilities for planning, development, and operation of any recreation facilities at Sites Reservoir will vary depending on which agency undertakes reservoir development. Federal agencies are bound by the Federal Water Project Recreation Act, whereas State Water Project facilities accommodate recreation as directed by the Davis-Dolwig Act. If a State or local agency operates a water project with power generation benefits, the Federal Energy Regulatory Commission will require a recreation plan. The responsibility for final recreation planning will be borne by the agency deemed most appropriate when project feasibility studies are complete.

Previous Studies

The construction of an offstream storage facility on the westside of the Sacramento Valley has been under consideration as a water supply option for several decades. While engineering aspects of Sites Reservoir and other potential westside reservoirs have received more extensive study and evaluation, examination of the recreation potential of Sites Reservoir has previously been of limited scope. Only one report about Sites recreation exists (NPS 1965), and that was done for a different-sized reservoir. Other reports have discussed recreation planning for potential Newville, Rancheria, Cottonwood Creek, and other Upper Sacramento River offstream storage and conveyance alternatives (DWR 1965; DWR 1968; DWR 1970; DPR 1967; DPR 1968; DOI 1967; USACE 1978).

The U.S. Department of the Interior, National Park Service investigated the recreation potential of Sites Reservoir in a 1965 report for the U.S. Bureau of

Reclamation's West Sacramento Canal Unit planning. This report identified some locations that could be developed as recreation areas at the reservoir, and made estimates of use and projections of costs and benefits. Most useable areas identified by NPS are located in the north end of the reservoir, except for a few that are on the west shore in the southern portion of the reservoir. The NPS study examined a USBR project formulation that featured a 480-foot elevation Sites Reservoir with only about 30 feet of average annual fluctuation.

Study Area and Assumptions

Access. The most direct access to Sites Reservoir is the Maxwell-Sites Road that provides access to and from Interstate 5. Other primary routes may become established after construction of the dams and the relocation of the inundated portion of this road around the reservoir. An assumption during this planning effort was that the road to Lodoga would be relocated around the north of the reservoir, though it may connect to I-5 several miles north of Maxwell. This road will also be the primary route to towns west of Sites Reservoir, such as Lodoga and Stonyford, and into the southwest portion of the Mendocino National Forest.

Huffmaster Road, which currently runs from the town of Sites down Antelope Valley to the south, would likely be rerouted along Mills Orchard Road (south of Maxwell-Sites Road). Heading south from Maxwell-Sites Road, it would likely turn to the west where it currently terminates at Standard Road.¹ From Standard Road, it would cross into the Antelope Valley through Sulphur Gap and meet the current Huffmaster Road just south of Sites Reservoir's southernmost high water mark. The alignment of these roads would be close to one area suitable for recreation development, although additional new access roads would still be required. Rerouted access will also need to be created to the communication towers that are located on the ridge south of the Sites Dam site. This access could also be provided via the Sulphur Gap alignment, perhaps in conjunction with recreation access roads.

Topography. Sites Reservoir would be situated in a broad valley with moderately sloped mountains on the west, precipitous slopes on the east, and a gently sloping valley floor to the north and south. The north end of the reservoir will require a series of saddle dams for impoundment. The steep topography of east side of the reservoir limits the feasibility of most recreation development there. Some southern and western areas have the opposite problem: gently sloping land below the high water line would make the water's edge rapidly become distant from developed areas during normal operations. Sparse vegetation and the exposed nature of lands adjacent to the northern areas limits the attractiveness of facility development there.

The west shore of Sites Reservoir would have numerous coves, peninsulas, and islands. This shore is not nearly as steep as the east shore and there are several areas that would be suitable locations for recreational facilities. In the middle of the valley, just to

¹ This alignment would prevent severing access to the existing Mathis Ranch to the north (along Fairview Road).

the north of the current location of the town of Sites, is a series of low, rolling hills. After inundation, the tops of several of these hills will remain exposed, creating about a half-dozen small islands in the middle of the reservoir. Several other islands will be formed along the west shore of the reservoir; the largest of these (about 50 acres) is the only one that is forested.

Seasonal Weather Variances. The Sites area experiences the typical Mediterranean pattern of cool, wet winters and dry, hot summers. Spring and fall could be described as pleasant. Annual precipitation averages 15 to 18 inches (NPS 1965). The area is close enough to the Sacramento Valley to occasionally be affected by valley fog in the winter. In the summer, temperatures can reach into the 90- and 100-degree range.

The implications of local weather for recreation potential is probably best illustrated by patterns observed at other local reservoirs such as Black Butte Lake, where USACE reports that peak use spans the months of March through August, and attendance is especially low during November through January.

Demographics and Local Economy. The Antelope Valley is a sparsely populated rural portion of north-central Colusa County. The population of a few dozen people is scattered throughout the valley with a small concentration (about 20) in the Sites townsite. The primary economic activity is cattle ranching and some non-irrigated crop production (irrigated crops are grown a short distance east of the valley).

To the east of the Sites Reservoir location is the town of Maxwell, a farm community with a few services and a population of about 1,400. This town is located just off of Interstate 5 and would be the closest town to the reservoir. It would be the most likely center for recreation-related services such as bait and tackle shops, motels, fuel, and restaurants if Sites Reservoir were constructed. Services such as these also exist in Williams, a town 9 miles south of Maxwell; Williams' services are currently oriented to the freeway traveler (rather than lake recreationists).

Existing Regional Recreational Use. Existing, public, reservoir-based recreation in the general vicinity is provided by four regional reservoirs: Black Butte Lake, East Park Reservoir, Stony Gorge Reservoir, and Indian Valley Reservoir. These reservoirs are significantly smaller than the proposed Sites Reservoir but are similar in terms of topography and relative remoteness. A range of facility development is present at these reservoirs but only Black Butte Lake has more than primitive facilities. A thorough description of each reservoir's facilities is compiled in Attachment A. Estimates of recreation use, provided by the respective managing agencies, are presented in Table 1.

Table 1. Annual total recreation use at four regional reservoirs (recreation-days in thousands).

Year	Reservoir			
	Black Butte	Stony Gorge	East Park	Indian Valley
1985	355	35	80	n/a
1986	414	32	80	n/a
1987	270	34	81	n/a
1988	323	34	81	n/a
1989	384	35	101	n/a
1990	343	66	66	n/a
1991	361	31	108	n/a
1992	416	32	80	n/a
1993	400	34	81	n/a
1994	372	34	81	n/a
1995	364	35	101	n/a
1996	336	66	66	n/a
1997	292	31	108	n/a
1998	n/a	n/a	n/a	38
Average	335	38	86	n/a

Suitable Recreation Development Lands

The suitability of lands to support reservoir-based recreation is influenced by many factors. Topography, access, physical/aesthetic setting, reservoir operations, anticipated use, and competing uses are important to consider. The following section discusses how these variables generally influence the recreation potential of the 1.8 maf Sites Reservoir alternative.

Based on our evaluation of these factors--using USGS maps and field visits to all Sites Reservoir shoreline areas--we identified a total of five areas which could potentially support development of recreation facilities without unusual or extensive additional engineering work (Figure 1). Some small additional wayside areas will probably be desirable where realigned roads are near the reservoir shoreline, but no alignment plan has been developed yet so these areas will be identified at a later date.

Lands underlying and immediately surrounding potential recreation areas total about 1,350 acres. Access road easements are not included in this estimate, but potential access alignments are illustrated in detailed site maps (Attachment B). We gave these areas tentative names to facilitate their description and discuss them below.

Conclusions about the suitability of these areas are based on a 1.8 maf reservoir with a maximum surface elevation of 520 feet. If a reservoir of another size is proposed, these areas would have to be reassessed to determine whether they would remain feasible as recreation sites. Existing trees, shrubs, grasslands, and rock outcrops contribute to the aesthetic qualities of many of the areas discussed below, and preservation of these features was assumed.

Peninsula Hills Recreation Area

The Peninsula Hills Recreation Area is located on the west shore of Sites Reservoir on what would be a large peninsula. It is nearly directly west across the reservoir from the Golden Gate Dam site. The area is comprised of a series of small coves and peninsulas that will be excellent for fishing and hiking. It is sheltered from north winds and a couple of small islands just off shore will add to the unique qualities of this area. Total acreage required for facilities described below is illustrated in Figure 1 and Attachment B and amounts to about 325 acres. Additional land may be required for access, water supply, and sewage disposal facilities.

The Peninsula Hills Area is exceptionally well suited for a large campground which could be implemented in several stages (the topography is conducive to several discrete but relatively adjacent loops). Fully developed, this campground could contain over 200 sites and some group facilities. There are two potential locations for a boat ramp, one to the north of the campground and one to the south of the campground. Both sites are large enough and of suitable slope for a four- (or more) lane ramp. Adjacent to the southernmost boat ramp is room for about 100 parking spaces (thereby making a two-lane ramp the appropriate size). The northern ramp location has an area over twice this size for parking (appropriate for a four- or six-lane ramp). Despite the smaller size, the preferred location would be the ramp to the south of the potential campground; this would decrease the traffic volume going past the campground, thereby decreasing noise and vehicle exhaust fumes in the area.

Access to the Peninsula Hills area, if development occurred there, would be from the relocated Sites-Lodoga Road. The most reasonable route would utilize a portion of the old Sites-Lodoga Road, east of where the new alignment would intersect the present road. Almost 2 miles of new access road would be required to connect the existing road with the usable areas of this peninsula. A variation of an existing jeep trail, up and over a steep ridge through a narrow gap and then down into the heart of the peninsula, is the most likely alignment.

Stone Corral Recreation Area

The Stone Coral Recreation Area would be located just to the north of the Sites dam. An oak woodland area along the ridge is of sufficient size and level topography to be suitable for a campground of about 50 sites (10 acres). The shoreline in this area is steep, limiting opportunities for placement of a boat ramp, but one small canyon to the north of the campground may accommodate two lanes (parking for over 100 car/trailer

combinations would fit in the grassy flat north of the campground). Shoreline fishing would be attractive because of the relatively deep water.

Excellent views in many directions can be found on this ridge. A trail from the campground south, to an overlook of the reservoir and the Sites Dam site, would be one of the best places for presentation of interpretive information to visitors about the cultural and natural history of the area. The overlook site is surrounded by aesthetic rock formations and could accommodate several interpretive displays (perhaps photographs of the area before the reservoir was built and information about Antelope Valley's history and the construction of the reservoir) as well as a few benches and picnic tables. About 225 acres would be required for facilities described above (Figure 1; Attachment B).

Saddle Dam Boat Ramp

A variety of alignments of the saddle dams necessary along Sites' northeast shore are possible. During recreation reconnaissance we assumed the westernmost alignment (Figure 1) would be the most likely, and this configuration would allow for the largest boat ramp and support facilities on the east shore. An east shore development is desirable because most recreation users will come from that direction, and it requires at least 12 additional miles of travel (one-way) to reach Peninsula Hills (location of the next-largest boat ramp, which has limited capacity). If a more eastern saddle dam alignment were constructed, the facilities described below could not reasonably be relocated elsewhere.²

Several of the hills separating the saddle dams are large enough to support construction of a boat ramp, but the one near the southwest corner of Section 19 (T18N, R4W) is the most ideal (Attachment B). The southeastern sides of the latter hill are of the proper slope and are expansive enough to accommodate a ramp of a dozen lanes. Expansive parking areas for hundreds of cars and trailers could be created in the barren grassland east of the saddle dams (center of southern half of Section 19, south to center of northern half of Section 30); other day-use facilities could be located on surrounding hills and slopes. It would probably be desirable and feasible to enhance aesthetics through tree-planting and other landscaping.

The amount of parking necessary is best determined by the number of lanes of boat ramp constructed, which in turn will be determined based on expectations of recreation use. This area also offers good opportunity for facility expansion if future needs require it. Generally, 50 parking spaces should be provided for each boat ramp lane, and 50 spaces requires about three-quarters of an acre (DPR 1967). Considering lands for access, day-use, and other facilities, about 600 acres would be required to develop the maximum recreation potential of this area (Figure 1; Attachment B).

Parking, support, and day-use areas associated with the Saddle Dam Boat Ramp, though outside the reservoir, are at lower elevation than the reservoir's full pool. Thus, final assessment of the suitability of these areas for recreation will require completion of

² With an eastern saddle dam alignment, recreation problems arise because areas level enough for parking and support facilities are undesirably far from the launching area. Slopes of eastern hills (potential ramp locations) generally do not reach below elevation 460 at suitable slope.

geological, soils, and engineering studies to evaluate the potential for seepage and other construction problems. It should also be noted that when the reservoir pool is high, a ready gravity-fed water supply (via siphon) would be available to irrigate landscaping (or create mitigation wetland areas). Even at lower reservoir levels, the lift to pump such a water supply would be much lower than at other areas.

Lurline Headwaters Recreation Area

The Lurline Creek headwaters are located on the eastern slopes of the ridge forming the southeast shore of Sites Reservoir. The top of the ridge and associated saddles, separating Lurline Creek from Sites Reservoir, would be the southernmost area suitable for developed recreation. About 2 miles of rough existing road would need to be upgraded to access this area, connecting it to the Sulphur Gap realignment of Huffmaster Road.

Lurline Headwaters Recreation Area could not provide ready shoreline access or a boat ramp--an existing ranch road could serve as a foot trail, but developed facilities would be about a quarter-mile from the shoreline (shoreline areas are generally too steep to allow construction of reasonable parking or turnaround areas). However, it is the largest area combining suitable slope, sufficient area, and aesthetic vegetation on the east shore. It is characterized by an open meadow surrounded by oak grassland, bordered by steep mountains, and situated so as to allow tantalizing views of the reservoir. It could support both camping and day-use, and creates an opportunity for a trail to the top of an adjacent (unnamed) 1,282-foot peak that offers outstanding views. Approximately 50 campsites, one or two group sites, and several dozen picnic units could be accommodated amongst the 50 acres of relatively level land in this area (Attachment B). Additional land for water supply and sanitary facilities may be required, depending on the level of development determined to be appropriate to meet recreation needs, but would probably fit within the greater area delineated. About 200 acres is the minimum needed to fully develop the recreation potential of this area (Figure 1).

Dunlap Island Boat-in Facilities

Dunlap Island would be the largest island, approximately 50 acres, formed by a full Sites Reservoir. It is located off the southwest shore and would remain separated from the mainland until the reservoir was drawn down to about 470 feet. There would still be reasonably good water access to the area with water surface as low as 380 feet; however, boat ramps would not be usable with water below 420 feet. This area would provide boaters with an area to camp off of the mainland near a secluded bay. The island has four distinct hilltops and their slopes and saddles are a mosaic of vegetation types including manzanita, grey pine, blue oak, and seasonal grasses. Only a few acres of Dunlap Island would be suitable for campground development, allowing comfortable spacing of perhaps a dozen campsites (Attachment B). Development of this area would have to be semi-primitive (no water supply, but including sanitary facilities) because of the remoteness.

Because Dunlap Island is within Sites Reservoir, it is assumed that this acreage will already be included among lands acquired for reservoir development. Thus, the 50 acres are not included in the total of additional shoreline lands desirable for potential recreation development.

Other Trails and Fishing Access

Several other recreation facilities may be appropriate at Sites Reservoir, though sufficient information about project features is not yet available to propose them for a specific location. These are features such as signed fishing access, trails and trail networks (hiking, bicycling, equestrian), and specially-designated hunting and off highway vehicle areas. Use of such facilities occurs at other regional reservoirs and it is presumable that demand for these facilities would occur at Sites. Listed below are some general observations about how these facilities might be incorporated into a future recreation plan.

Sites Reservoir Loop Trail. A multi-use trail for hiking, biking, and equestrians extending around Sites Reservoir to form a loop could connect all of the recreation areas at Sites Reservoir. Beginning at the Sites Dam and heading north, the trail could extend along the crest of Logan Ridge to the outlet works. Here it would cross the narrow isthmus left after construction and then head across the Golden Gate Dam. From this point it could continue along the treeless Logan Ridge for approximately 3 miles where it would then drop off the ridge into Antelope Valley. At this point, the northern end of the reservoir is impounded by a combination of natural barriers (small hills) and a series of saddle dams. The trail could either utilize the saddle dams and hilltops along the shoreline to cross the valley or could cut across the grassy plain in a northwesterly direction to the northernmost and longest saddle dam. It might share some of this route with the relocated Sites-Lodoga Road. If this is the case then a bike lane would need to be added to ensure a safe path for all traffic.

Once the trail traversed Antelope Valley it would enter the hills that form Sites Reservoir's western shoreline. Here it would turn south and meander along the west shore's many inlets and peninsulas. Several overlook, fishing access, or small picnic areas could be located along this portion of the trail; however, it would be unlikely that sanitation facilities or potable water could be provided.

When the trail intersected with the old Sites-Lodoga Road, it would head to the east for approximately one-half mile along the road, which would also be used for access to the Peninsula Hills Recreation Area. A bike lane would be needed here. Where the new road turns to the north to go to the recreation area, the trail would continue along the old road alignment to the reservoir shoreline following Stone Corral Creek.

From the point where Stone Corral Creek flows into the reservoir, the trail would follow the west shoreline for 8 to 10 miles through steep terrain of oak woodland and open grassland. This portion of the trail would be the most remote section and would meander around the numerous coves and peninsulas. This might be an appropriate area to designate for primitive or wilderness camping.

The best route to continue from the southern end of the reservoir, north to close the loop at Sites Dam site, is somewhat less clear. Options exist to use part of the alignment of the relocated Huffmaster Road through Sulphur Gap and/or other old ranch roads and Lurline Headwaters and radio tower access roads, establishing a more "inland" alignment. Or portions of the trail could be constructed at lower elevations along the shoreline through oak grasslands of moderate slope.

Vista Points. More often than not, the ridges and hilltops surrounding Sites Reservoir offer commanding views of the Sutter Buttes, Black Butte, Mt. Shasta, Mt. Lassen, Snow Mountain, the Sacramento Valley, and other foothill valleys and mountain ranges of the Mendocino National Forest. Almost all these features are simultaneously visible from some of the peaks east of the reservoir. Wildlife and wildflowers also occur seasonally. Depending on the alignment of realigned and recreation access roads, wayside trailheads might be established at convenient points to lead visitors to some of these dramatic vistas.

Fishing Access. The relocation of Sites-Lodoga Road would offer the best opportunity for dispersed shoreline fishing access. This would be the only road circumnavigating the reservoir within close proximity to the shoreline. Points around the reservoir on the new roads could be designated as fishing access, as could remnants of existing roads that may otherwise be abandoned. The best points would typically be in areas where the shoreline is steep enough that the fishing waters are moderately deep, but not so steep as to make footing treacherous.

Pre-project Fishing Enhancement. Sites Reservoir would inundate several existing stock ponds. Some of these ponds are large and persistent enough to support fish under current conditions. They are available as a resource to raise brood stock as a seed population to accelerate establishment of a recreational fishery after Sites Reservoir is filled (when these areas are over-flooded, the fish can escape and begin populating the reservoir). This approach was used at Eastside Reservoir at the recommendation of the Department of Fish and Game.

Cartop Boat Ramps. Abandoned roads, such as the western portion of the Sites-Lodoga Road, the southern portion of Huffmaster Road, and several ranch roads, may potentially serve as cartop boat ramps. Such relatively undeveloped access is often popular with local residents who seek shoreline access away from more heavily used developed facilities (CSUC 1997). As long as old roadbeds and alignments remain safe, or can be maintained, such access can provide recreation benefits.

Stone Corral Coldwater Fishery. Sites Dam plans have tentatively included a release valve to allow discharge of reservoir water into Stone Corral Creek. This discharge would be cold water from the bottom of the reservoir and, if maintained year-round, would help establish a coldwater sport fishery below Sites Dam. Local coldwater angling opportunities are essentially nonexistent, and this type of recreation often has a relatively high benefit value. Tailwater fisheries are often of high quality. However, much of the land downstream from Sites Dam is in private ownership, with perhaps some opportunity for public access immediately below the dam.

If there is public access below the Sites Dam discharge, it is likely to be a popular location for anglers. This opportunity should be further evaluated once project formulation and dam operation criteria are decided.

Estimated Present and Future Recreation Use

Present Recreation Use

Recreation use and opportunity is currently quite limited within the project area. All of the land in Antelope Valley is privately owned and most is posted against trespass, thereby preventing general public access. Recreational activity that does take place is primarily by the landowners, their families and friends, and employees and probably amounts to only a few hundred recreation-hours per year. On these agricultural lands, hunting is the most common activity. Upland game birds, deer, and wild boar are the most sought after species. Occasional horseback riding and OHV use has been observed. Fishing is an infrequent activity because of the intermittent nature of the streams in the Antelope Valley, but DWR personnel have observed children fishing Stone Corral Creek just downstream of the location of the proposed Sites Dam site. There are many stock ponds located throughout the area and several are large enough to support populations of bass, sunfish, and catfish. It is not known if these ponds are fished by the owners or others.

Potential Recreation Use

A lake the size of Sites Reservoir has the potential for many types of recreation activities for a large number of people. Water-related activities can include boating, waterskiing, personal water craft use, fishing, and swimming. Land-based uses could include camping, hiking, biking, horseback riding, picnicking, hunting, and sightseeing. A reservoir at this location would be accessible year-round, but a great majority of the recreation use would occur during the traditional recreation season, typically March through September. Other factors could also conceivably influence the popularity of Sites Reservoir: State health advisories apply to consumption of sport-fish from many waters in western California, and additional study may still determine if the fishery at Sites Reservoir might be more or less attractive (than other local waters) to anglers.

Initial recreation development is normally based on estimated demand during the early years of the project. Table 1 suggests that Sites Reservoir may attract several hundred thousand recreation-days per year. However, the limited amount of lands suitable for recreation development (and the limited amount of facilities those lands can accommodate) may limit the number of recreationists expected at Sites Reservoir by limiting the maximum persons-at-one-time (PAOT). Even if full development of all four major shoreline recreation areas (excluding Dunlap Island) were feasible, there would be proportionately few facilities present compared to reservoirs much smaller (e.g., Black Butte) or modestly larger (e.g., Lake Oroville). Thus, facilities at Sites Reservoir might be expected to be filled to capacity more frequently than at other reservoirs. There would be negligible opportunity to expand facilities to meet increased future demand.

To properly estimate the recreation demand and amount of use expected at Sites Reservoir, recreation planners would use the Comparable Demand Method. This method assumes that use at a new reservoir would be similar to use at a similar existing reservoir. A recreation use survey at the existing reservoir is the basis for assumptions about the recreation activities and home origin of the visitors at the proposed facility.

In preparation for future work, we have prepared a set of maps which illustrate the travel distance from Sites to surrounding population centers at discrete distances (Attachment C). Comparison of frequency of visitation from analogous areas surrounding an existing comparable reservoir will be the basis for estimating demand for recreation from the population surrounding Sites. This analysis is beyond the scope and capability of this brief study, but some recommendations for future work are worth consideration.

The comparable reservoir selected as the basis for future estimates may likely be either Black Butte, Oroville, or San Luis. There are pros and cons to each choice. Lake Oroville, about 70 miles away, is substantially larger and surrounded by a complex of afterbays and many recreation areas, but relatively recent recreation use data is available (CSUC 1997). Black Butte Reservoir is substantially smaller than Sites, but has similar facilities and would conceivably draw visitors from the same population areas. Attendance data at Black Butte is collected by traffic counters, but a recreation use survey would be necessary to determine the frequency of various types of use occurring and the origin of the visitors there. San Luis Reservoir was used as the comparable reservoir when the Los Banos Grandes Reservoir was planned (Rischbieter and Hinton 1993), and LBG was to be similar in size to Sites, but San Luis draws visitors from much different population centers. Also, existing detailed San Luis visitor use survey data is becoming outdated (Tittel 1986), and another recreation survey would likely be necessary.

A Visitor Characteristics Summary for the four main developed areas of Black Butte Lake, derived from USACE surveys in 1994, gives some insight to types of use occurring there (Table 2). Additional information for all Black Butte areas collectively was summarized for 1985 (Table 3); the most recent similar information found for East Park and Stony Gorge dates back to 1980. Visitor origin data is typical of other reservoirs such as Oroville and San Luis: roughly three-quarters of the use is by people who live less than 50 miles away.

Alternatives to Full Sites Reservoir Development

There may still be unforeseen obstacles that could preclude full development of the apparent recreation potential of Sites Reservoir. There may be no agency obligated or willing to invest in or operate recreation facilities, or the costs of infrastructure development may be prohibitively high for anything more than primitive facilities. Therefore, alternatives to full development must still be considered. Lesser or no facility development would not meet the anticipated recreation demand, greatly limiting the use and recreation benefits provided by Sites Reservoir.

**Table 2. Black Butte Lake Visitor Characteristics Summary
(derived from USACE 1994 Visitor Estimation and Recording System
[VERS] Surveys).**

Recreation Area	Eagle Pass	Buckhorn	Orland Buttes	Observation
<i>General use breakdown (percentage of visitors):</i>				
Day Use	98.5	71.1	71.7	100.0
Overnight Use	1.5	28.9	28.3	0.0
<i>Percent of visitors engaging in these activities:</i>				
Camping	0.0	28.6	27.1	0.0
Picnicking	53.7	33.7	36.3	10.0
Boating	46.6	24.9	26.9	0.0
Boat Fishing	15.0	8.5	24.0	0.0
Shore Fishing	16.4	14.6	16.5	65.0
Water-Skiing	20.9	4.5	0.0	0.0
Swimming	48.4	57.8	53.1	0.0
Sightseeing	22.2	15.7	23.7	30.0
<i>General per-visit statistics:</i>				
Camping Stay	0.0 days	1.83 days	1.65 days	0.0 days
Day Use Stay	3.54 hours	3.32 hours	2.94 hours	1.40 hours
Weekend Use	52%	57%	45%	
People/Vehicle	2.60	2.98	2.85	1.60

Table 3. Black Butte Lake Visitor Characteristics Summary, collected by USACE in 1985

(J. J. Holmberg, USACE, personal communication), and comparable information for Stony Gorge and East Park Reservoirs (1980). Note: n/a = not available; n/m = not meaningful; * = includes boat fishing.

Activity	Percent User Participation ³		
	Black Butte	Stony Gorge	East Park
Day Use	86.5	73.1	58.9
Camping	13.5	26.9	41.1
Picnicking	20.5	11.0	2.8
All Boating	29.0	n/m	n/m
Water Skiing	12.1	25.1	14.9
Boat Fishing	10.5	n/a	n/a
Shore Fishing	16.5	20.1*	20.7*
Swimming	35.6	5.7	7.9
OHV Use	0.2	n/a	n/a
Hiking	1.9	n/a	n/a
Sightseeing	24.0	4.1	3.3
Other	7.2	4.3	0.9
Use Characteristic			
Length of Camping Stay (days)	2.5		
Length of Day Use Stay (hours)	2.8		
Average Number of People per Vehicle	2.6		
Percent Weekend Use	45.0		
Percent Overnight Use	13.5		
Origin Radius (miles)		Percent Of Visitors	
0 - 25	49	n/a	n/a
26 - 50	25	n/a	n/a
51 - 75	4	n/a	n/a
75 - 100	0.7	n/a	n/a
Beyond 100	21	n/a	n/a

Lesser or Minimal Development. The option of lesser or minimal development could be exercised for several reasons. In the event that actual reservoir operations were

³ These percentages add up to more than 100% for Black Butte Reservoir (visitors engaged in more than one activity during their stay). This behavior is not reflected at the other reservoirs because of differing data collection and reporting methods.

even more severe than reservoir operation criteria assumed for this study, requiring extreme drawdown from year to year, recreation potential (and recreational fishery values) would be greatly diminished. In such a case, primitive facilities (similar to those at Stony Gorge and East Park) would suffice to support some visitors when the reservoir is usable. Cartop boat ramps could be maintained where abandoned roads extend to the water's edge. Dispersed tables for primitive camping and day-use could be located in areas near relocated roads. Some development could occur at the best areas identified herein, but a reservoir with frequent severe drawdown, especially during the prime recreation season, will not attract enough visitors to warrant full development of most (if any) areas. The cost of development of recreation facilities, especially access roads, might not be justified if use (and recreation benefits) are low.

Offsite Development. If the developer or operator of Sites Reservoir were to have an obligation to plan for recreation use, and if the recreation development potential of Sites Reservoir is inadequate to meet demand, there are abundant opportunities to enhance or expand existing reservoir-based recreation at other local reservoirs. Therefore, offsite development at nearby reservoirs may be an option to mitigate unmet recreation demand at Sites Reservoir. Both East Park and Stony Gorge are surrounded by attractive shoreline and have virtually no high-standard facilities. Primitive facilities are abundant. Upgrading primitive facilities (campgrounds, boat ramps) to higher standards would increase regional recreation opportunities and the local capacity for higher quality recreation.

Additional Data Required For Future Planning

Several additional pieces of information are required before feasibility-level recreation planning can proceed. These include selection of reservoir operating criteria; selection of the agency responsible for the development of Sites Reservoir (to clarify the obligation for recreation planning and level of development); determination of the costs for land for recreation facilities and roads; a tally of the population residing in the areas likely to be served by Sites Reservoir (Attachment D); and a contemporary survey of current use at one or two nearby existing reservoirs.

The recreation benefits afforded each visitor are directly related to the frequency that facilities are usable and aesthetic. Operations that cause the shoreline to recede from facilities, especially during the prime recreation season, will result in less benefit than operations resulting in a more stable pool. Frequent fluctuation and severe drawdown can diminish the quality (and value) of a sport fishery. The benefits the project affords to each visitor, and cumulatively each year of the project, will depend on the operating criteria selected.

Obligations and responsibilities for planning, development, and operation of any recreation facilities at Sites Reservoir depend on which agency undertakes reservoir development. Federal agencies are bound by the Federal Water Project Recreation Act, which would also apply in the case of a joint federal-State project (e.g., CALFED). California's Davis-Dolwig Act would apply only if Sites Reservoir were developed as a State Water Project facility. If a State or local agency operates a water project with power

generation benefits, the Federal Energy Regulatory Commission will require a recreation plan. The responsibility for final recreation planning will be borne by the agency deemed most appropriate when project feasibility studies are complete, and a likely recreation agency is determined.

Cost estimates for construction, operation, and maintenance of Sites Reservoir recreation facilities were not calculated during this investigation. Actual facilities would cost several million dollars, and cost for access roads would also be substantial. Costs will vary depending on the level of development proposed and other unknown factors such as alignment of relocated roads. Land acquisition costs should be the first consideration if project developers wish to maintain a variety of recreation options. Additional lands or easements may be required for access roads and other resource values.

Attachment D identifies zones within California from which recreationists are most likely to be drawn (it is unlikely that a significant number of visitors would originate from out of state, because of the travel distance involved). Department of Finance estimates or U.S. Census results need to be analyzed to estimate the population within each polygon illustrated in Attachment D. The resulting estimates will be used in conjunction with the Comparable Demand Method of predicting Sites Reservoir attendance based on measured attendance at a similar, existing reservoir.

Contemporary, detailed attendance and recreation use data from one or two existing local reservoirs is necessary to adequately predict the likely attendance at Sites Reservoir. Black Butte Lake, plus one of the other Stony Creek reservoirs, would probably be most appropriate because of their location, but each is substantially smaller than Sites Reservoir. Current efforts to monitor use at these reservoirs is minimal, so it is recommended that sampling (visitor counts and interviews) be done over a season-long period to obtain information adequate to predict use at Sites. Data collected recently at larger Lake Oroville (CSUC 1996) should also be considered, but Lake Oroville is not an ideal comparison to Sites because the density of population near Oroville is much greater.

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